

Notes on Oegopsid Cephalopods found in Japan.

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With Plate III.

In the present paper all the species of Oegopsid Cephalopods known from Japan are listed and noted on. My study of the group was done mainly on specimens preserved in the Science College, Tokyo; in the Sapporo Agricultural College; in the Takashima Fishery Experimental Institute, Hokkaido; and in the Namerikawa Fishery Institute, Etchu Prov. The species number twenty-nine in all, representing twenty-two genera. One of the latter seems to be new to science and presents some interesting features.

Division **Oegopsida** d'Orbigny 1839.

Fam. **Architeuthidæ** Pfeffer 1900.

Genus **Architeuthis** Steenstrup 1857.

I. ***Architeuthis japonica*** Pfeffer 1912.

Mitsukuri & Ikeda 1895, p. 39, pl. x (without name). Tateyama Bay, Awa Prov.

Architeuthis martensii, Berry 1912a, p. 433.

Architeuthis japonica, Pfeffer 1912, p. 27.

Of this species no other specimen than that which was described by Mitsukuri and Ikeda and is preserved in the Sci. Coll., has come under my observation.

2. ***Architeuthis martensii*** (Hilgendorf 1880).

Megateuthis martensii, Hilgendorf 1880, p. 65. Tokyo market.

Architeuthis martensii, Steenstrup 1882b, p. 157.—Berry 1912a, p. 433.

Architeuthis martensii, Pfeffer 1912, p. 31.

This species is possibly identical with *A. japonica* Pfeffer, but as Hilgendorf's original description of it is based on a defective specimen, a definite decision of the point must be left to the future.

Fam. **Onychoteuthidæ** Gray 1849.Subfam. **Onychoteuthinæ** Pfeffer 1912.Genus **Onychoteuthis** Lichtenstein 1818.3. ***Onychoteuthis banksii*** (Leach 1817).

Local name : Tsume-ika (Tokachi).

Loligo banksii, Leach 1817, p. 141.

Onychoteuthis banksii, Fér. et d'Orb. 1839, p. 336, Onychot. pls. i-v, vii, ix, pl. xii, figs. 1-9.

—Gray 1849, p. 53.—Goodrich 1896, p. 11. Sandheads, Bay of Bengal.—Pfeffer

1900, p. 159.—Hoyle 1904, p. 35. Tropical Pacific Ocean.—Hoyle 1904a, p. 19.

—Pfeffer 1908a, p. 65, figs. 71-77.—Pfeffer 1912, p. 70, pl. iii, figs. 13-25, pls.

iv-vi. Many examples from the temperate and tropical regions of all the oceans and

seas.—Berry 1914, p. 322, text-fig. 31. Laysan Island.

A single ♀ specimen captured by the Takashima Fishery Institute steamer "Tankaimaru" at Ōtsu, Tokachi Prov., Hokkaido, August 1, 1913. Mantle-length 283 mm. This widely distributed species has hitherto been known, so far as concern the Japanese waters, only from Formosa (Pfeffer 1912).

Genus **Moroteuthis** Verrill 1880.4. ***Moroteuthis robusta*** Dall 1876.

Moroteuthis robusta Dall MS., Verrill 1876, p. 236. Iliulik, Unalaska.—Verrill 1880, pp.

195, 246, 395, pls. xxiii, xxiv.—Verrill 1882, pp. 275, 419, pls. xiii, xiv.—Pfeffer

1900, p. 161.—Pfeffer 1908a, p. 68, figs. 78, 79a, b.—Pfeffer 1912, p. 105.—

Ishikawa & Wakiya 1914, p. 435, pls. xliii, xliv. From stomach of a sperm whale caught in the open sea off to the south of the Strait of Tsugaru.

5. *Moroteuthis lönnbergii* Ishikawa & Wakiya 1914.

Local name : Kagi-ika (Sagami Prov.).

Moroteuthis lönnbergii, Ishikawa & Wakiya 1914a, p. 445, pls. xlv, xlv. Hayama, Sagami Bay; Misaki.

Following specimens were examined by me.

Number of specimens	Mantle-length	Locality	Date	Where preserved
2 ♀	162; 170 mm.	Off Atami, Sagami	June 24, 1906	Sci. Coll.
1 ♀	210 "	Misaki	June 1895	do.
1 ♀	207 "	do.	August 11, 1896	do.

Fam. *Enoploteuthidæ* Pfeffer 1900.Subfam. *Enoploteuthinæ* Chun 1910.Genus *Enoploteuthis* Fér. et d'Orb. 1839.6. *Enoploteuthis chunii* Ishikawa 1914.*Enoploteuthis chunii*, Ishikawa 1914, p. 401, pls. xxxviii, xxxix. Toyama Bay.

Specimens examined by me.

Specimen	Mantle-length	Locality	Date	Where preserved
1 ♂	63 mm.	Uodzu, Etchu	April 24, 1913	Agr. Coll.
1 ♂	62 "	Namerikawa Etchu	April 25, 1913	do.
1 ♀	60 "	do.	May 1913	do.
1 ♀	81 "	do.	June 2, 1913	do.
1 ♀	87 "	do.	June 1913	do.

This cuttle-fish is often caught, mixed in large schools of *Watasenia scintillans* (Berry), on the coast of Etchu Prov. Prof. Ishikawa's type specimens of the species have come from that region. The hectocotylized arm is the right ventral arm, of which it is mainly the distal part that undergoes modification. In the terminal part but a short distance from the extremity, the narrow protective membranes of both sides are

swollen and form two elongate semilunar membranes, as is commonly the case in species of the Enoploteuthidæ. The membranes are equal in size and length; only the ventral one is situated a little more proximally than the dorsal. The hooks on this arm number twenty-six, of which the distal six are placed opposite the ventral semilunar membrane. The terminal part of the arm, beyond the semilunar membranes, shows twenty-one small suckers, which fact apparently constitutes a characteristic feature of the species.

Genus **Abralia** Gray 1849.

7. ***Abralia andamanica*** Goodrich 1894.

Local name : Gumi-ika (Odawara).

Abralia andamanica, Goodrich 1896, p. 9, pl. ii, figs. 38-45. Andaman Sea.

Asteroteuthis andamanica, Pfeffer 1912, p. 137.

Two ♂ specimens (in alcohol) were collected at Odawara, June 1891 (Sci Coll.). Their principal dimensions are as follows :

Specimen No.	1.		2.	
Dorsal length of mantle	34 mm.		35 mm.	
Breadth of mantle... ..	14 "		13 "	
Length of fin	23 "		23 "	
Total breadth of fins	30 "		23 "	
Dorsal length of head	11 "		11 "	
Breadth of head	12 "		13 "	
Length of first arm	Left 20 mm.	Right 20 mm.	Left 20 mm.	Right 20 mm.
" , second arm	25 "	24 "	24 "	24 "
" , third arm	20 "	21 "	21 "	21 "
" , fourth arm	22 "	22 "	22 "	22 "
Length of tentacle... ..	44 "	43 "	44 "	45 "
" , club	6 "	6 "	6 "	6 "
Length of gladius... ..	28 mm.		—	
Breadth of gladius... ..	6 "		—	

This is to my knowledge the first case of the species having been ever obtained after it was first described. Both the specimens deviate from Goodrich's original description, which is based on specimens from the Andaman Sea (1896), in the following points: (1) In the Japanese specimens, the second pair of arms is distinctly longer than others and that even than the fourth, while in the Andaman specimens the second is as long as the fourth, both being the longest of all. (2) The distal suckers of first, second and third arms are a little more numerous than as given by Goodrich. The numbers of hooks and suckers in the Japanese specimens are given in the following table:

		Right arms				Left arms			
		IV	III	II	I	I	II	III	IV
Sp. No. 1.	Hooks	13	13	14	13	12	13	13	14
	Suckers {Larger Smaller... ..	15	11	11	10	10	12	11	0
		0	26	26	25	25	24	24	0
Sp. No. 2.	Hooks	14	13	13	13	13	12	13	14
	Suckers {Larger Smaller... ..	14	11	11	11	10	12	11	0
		0	26	26	26	25	25	26	0

As the Andaman specimens were all females, the hectocotilized arm has not been known. I find it resembles in appearance very much that of *Abralia veranyi* (Rüpp.). The arm is the left ventral. It is provided, along the distal part a short distance from its extreme end, with two elongate semilunar membranes which are continuations of the narrow protective membranes of the proximal part. The ventral of the semilunar membranes is situated a little more proximally than the dorsal one. The hooks number fourteen, of which the three terminal ones are situated just opposite the ventral semilunar membrane. The terminal part of the arm beyond the semilunar membranes is smooth and without any sucker.

The luminous organs of the body surface are not uniform in appearance but may be classified into three kinds as in *A. veranyi*: (1) Those

containing a large amount of pigment, occurring most commonly on the ventral surface of mantle, siphon, head and two ventral pairs of arms, and in a less number on dorsal connective ligaments of siphon. (2) Those of small size found on mantle intermixed among the first kind but less numerous than the latter; they occur also on other parts, though more sparsely than on mantle. (3) Those with a small amount of pigment, occurring most rarely of all and distributed uniformly among the preceding kinds.

Genus **Abraliopsis** Joubin 1896.

8. ***Abraliopsis nishikawæ*** Pfeffer 1912.

Abraliopsis sp., Nishikawa 1906a, pp. 310, 311 pl. vi, figs. 1-11. Aburatsubo, Misaki.

Abraliopsis (*Nepioteuthion*) *nishikawæ*, Pfeffer 1912, pp. 139, 140, 149.

Pfeffer (1912) has given the two kinds of larval cuttle-fishes previously described by Mr. Nishikawa under the name of *Abraliopsis nishikawæ*, considering the younger of the two as the *Nepioteuthion* stage and the older as the *Comphoteuthis* stage of the species. To me it seems doubtful if the two young individuals belong to one and the same species. Indeed, I am inclined to leave the younger specimen in *Abraliopsis nishikawæ* of Pfeffer, but to identify the older with *Watasenia scintillans* (Berry).

Genus **Watasenia** Ishikawa 1913.

9. ***Watasenia scintillans*** (Berry 1911).

Local name: Hotaru-ika, Matsu-ika, Ko-ika (Etchu Prov.)

Beni-ika, Gumi-ika (Odawara, Sagami Prov.)

Watase 1905, p. 119, 1 text-fig. (without name). Etchu Prov.

Abraliopsis sp. Nishikawa 1906a, pp. 311-312, pl. vi, figs. 13-15, Enoura, Suruga Prov.

Abraliopsis scintillans, Berry 1911, p. 93. Japan.—Berry 1912a, p. 424, pls. vii, viii, pl. ix, figs. 1-6.—Berry 1913, p. 591.

? *Abraliopsis* (*Compsoteuthis*) *nishikawæ*, Pfeffer 1912, pp. 150, 162.

Watasenia scintillans, Ishikawa 1913a, pp. 162, 336; 6 figs. Etchu Prov.—Sasaki 1914, p. 75, pls. i, ii. Etchu Prov.

Specimens examined by me :

Specimens	Mantle-length	Locality	Date	Collector	Where preserved
16♂	36-44 mm.	Nishimisaki, Awa	Feb. 16, 1891	—	Sci. Coll.
1♂	35 mm.	Okhotsk Sea	Fishing season of Cod (July ?), 1916	Mr. K. Kato	Mr. K. Tago
4♂	36-42 mm.	Hazamamura, Awa	Middle February, 1907	Prof. A. Oka	Sci. Coll.
87♂, 17 ♀	—	Odawara, Sagami	Early March, 1907	—	do.
81♂	36-54 mm.	Shirahama, Awa	Feb. 9, 1908	—	do.
10♂, 23 ♀	—	Odawara	Middle March, year ?	—	do.
53♂, 132 ♀	35-50 mm. in ♂ 42-64 mm. in ♀	Namerikawa, Etchu	April 19—May 5, 1913	Author	Agr. Coll.
1♂, 2 ♀	42 mm. in ♂, 47 mm., 60 mm. in ♀	Uodzu, Etchu	April 24, 1913	Author	do.

Subfam. *Ancistrochirinae* Pfeffer 1912.Genus *Thelidioteuthis* Pfeffer 1900.10. *Thelidioteuthis alessandrinii* (Vérany 1851).

Loligo alessandrinii, Vérany 1851, p. 99, pl. xxxv, figs. f-h. Nice.

Enoploteuthis polyonyx, Troschel 1857, p. 67, pl. iv, fig. 9. Messina.

Abralia megalops, Verrill 1883, p. 105, pl. iii, fig. 4. West India.—Verrill 1884, p. 143, pl. xxviii, fig. 2, pl. xlv, figs. 2, 2a. East coast of North America.

Enoploteuthis pallida, Pfeffer 1884, p. 18, figs. 23, 23a, 23b.

Calliteuthis alessandrinii, Appellöf 1889, p. 27, figs. 7-11. Messina.

Thelidioteuthis polyonyx, Pfeffer 1900, p. 167.

Thelidioteuthis alessandrinii, Chun 1910, p. 104, pl. vii, figs. 16, 17. Indian Ocean.—Pfeffer 1912, p. 178, pl. xviii, figs. 1-29. South-Atlantic Ocean, Messina, Society Isl.—Berry 1912a, p. 432. Kagoshima Bay.

The species has not come under the author's observation.

Subfam. **Octopodoteuthinæ** Pfeffer 1912.Genus **Octopodoteuthis** Rüppell 1844.11. ***Octopodoteuthis sicula*** Rüppell 1844.

Octopodoteuthis sicula, Rüppell 1844, p. 135 (fide Appellöf).—Gray 1849, p. 51. Sicily.—Pfeffer 1884, p. 28. Messina.—Pfeffer 1900, p. 166.—Massy 1907, p. 381. South-western coast of Ireland.—Pfeffer 1908, p. 74, fig. 81. Mediterranean Sea.—Pfeffer 1912, p. 213, pl. xix, figs. 1-16. Messina, North Atlantic.

Verania sicula, Krohn 1847, p. 38. Sicily.—Verany 1851, p. 86, pl. xxviii.—Weiss 1889, p. 87, pl. viii, figs. 1-3.—Appellöf 1899, p. 6, figs. 12-23. Messina.—Jatta 1896, p. 92, pl. vii, fig. 14, pl. xiii, figs. 1-12. Neapel.—Ficalbi 1899, p. 83.

Octopodoteuthis, Chun 1910, pp. 139, 144. pl. xvii. Sagami-bai, Japan; Agulhasstrom; Binnenmeer von Westsumatra; Indischer Nordäquatorialstrom; Golf von Aden.

Material examined: One specimen (♀ ?) obtained by Prof. A. Oka, Tateyama, Awa Prov. April 1896 (Sci. Coll.). Dimensions: dorsal length of mantle 27 mm.; breadth of mantle 135 mm., breadth of head 12 mm., length of fin 21 mm., total breadth of fins 31 mm., length of first pair of arms 19 mm., length of second pair 19 mm., length of third pair 23 mm., length of fourth pair 18 mm. Tentacles are absent, as is usual in mature specimens. The eye-openings are of an oval shape and, contrary to Pfeffer's statement (1912, p. 214), without any sinus at the anterior margin; terminal suckers on each arm can not be detected even under the microscope.

Fam. **Gonatidæ** (Hoyle 1886) Pfeffer 1900.Genus **Gonatus** Gray 1849.12. ***Gonatus fabricii*** (Lichtenstein 1818).

Onychoteuthis fabricii, Lichtenstein 1818, p. 13 (fide Pfeffer).

Onychoteuthis kamtschatica, Middendorff 1849, p. 186, pl. xii, figs. 1-6. Kamtschatka.

Gonatus amana, Gray 1849, p. 68.—Adams 1858, p. 36, pl. iv, fig. 2.—Verrill 1881a, pp. 291, 388, 390, 428.

Gonatus amarus, Sars 1878, p. 336, pl. xxxi, figs. 1-15, p. xvii, fig. 2. Norway.

Lestoteuthis Kamtschatica, Verrill 1881, p. 251.

Gonatus fabricii, Steenstrup 1881, p. 9, pl. i. Davis Strait, Greenland, Iceland, Færös,

- Atlantic, Mediterranean, South of Cape of Good Hope.—Verrill 1880, p. 291, pl. xlv, figs. 1-1b, 2-2d. Off Seal Island, Nova Scotia, from stomach of a cod.—Verrill 1882, p. 289, pl. xv, figs. 1-1c, 2-2d.—Steenstrup 1882, p. 143, pl. i. Japan.—Hoyle 1886, pp. 41, 174. Lat. $58^{\circ}45'N.$, Long. $48^{\circ}39'W.$ —Hoyle 1889, p. 117-135, pl. xiii, xiv.—Appellöf 1892, p. 9. Jan Mayen.—Pfeffer 1900, p. 163.—Pfeffer 1908, p. 71, figs. 80-84.—Pfeffer 1912, p. 230, pl. xv, figs. 17-22. Greenland, Punta Arenas.—Berry 1912, p. 308, pl. lii, figs. 1-4, pl. liii, pl. liv, figs. 1-4, pl. lv. Monterey Bay, California; off San Nicolas Island, Cal.; off North Coronado Island, Lower Cal.—Berry 1912a, p. 424.
- Cheloteuthis rapax*, Verrill 1881, p. 293, pl. xlix, fig. 1. 100 miles south of Newport, from stomach of a fish.—Verrill 1881a, p. 110, pl. ii, figs. 1-1f.—Verrill 1882, p. 286, pl. xv, figs. 3-3f, 4.
- Lestoteuthis fabricii*, Verrill 1880, pp. 291, 293, 387-390, 428, pl. xlv, figs. 1, 2, pl. xlix, fig. 1. pl. lv, fig. 1.—Verrill 1882, p. 416, pl. xlv, figs. 1-1d.—Dall 1886, p. 209. Bering-insel.
- Gonatus antarcticus*, Lönnberg 1898, p. 51, pl. v, figs. 4, 5. Punta Arenas.

In the region of Japan and vicinity, specimens of the species are said to have been obtained in Shumshu Island, Kuril Group (Middendorff); in Bering Sea (Dall) and in Japan (Steenstrup). Japanese specimens have not yet come under the author's observation.

13. *Gonatus magister* Berry 1913.

Local name : Dosu-ika (Etchu Prov.).

- Gonatus fabricii* (?), Berry 1912, p. 310, pl. lii, figs. 1, 2, pl. liii, pl. liv, figs. 1-4, pl. lv, figs. 1, 3-7. Victoria, B.C.; Puget Sound, Wash.
- Gonatus magister*, Berry 1913a, p. 76.
- Gonatus septemdentatus*, Sasaki 1915a, p. 185. Etchu Prov.

The species is one which stands in very near relationship to *Gonatus fabricii* (Lichtenstein), but differs from this in the following respects :

Tentacles with very minute suckers only. Three dorsal pairs of arms with 2 marginal series of small suckers and 2 central series of hooks, except in basal and distal parts where there exist only suckers arranged in 4 series. Radula with 7 series of teeth; middle tooth tricuspid, lateral teeth bicuspid; both marginals unicuspid.

Fam. **Histioteuthidae** Verrill 1881.Genus **Stigmatoteuthis** Pfeffer 1910.14. ***Stigmatoteuthis japonica*** Pfeffer 1912.

Calliteuthis reversa, Hoyle 1886, p. 183, pl. xxxiii, figs. 12-15. Hyalonema ground off Enoshima, Sagami Bay; New Zealand.

Stigmatoteuthis japonica, Pfeffer 1912, p. 234.

This species has not been rediscovered since it was first described.

15. ***Stigmatoteuthis dofleini*** Pfeffer 1912.

Local name : Kurage-dako (Awa).

Calliteuthis reversa, Chun 1906, pp. 747, 751, 752, figs. 2, 4, 5. Sagami Bay.

Calliteuthis ocellata, Chun 1910, pp. 147-169, 170, text-pl. i, figs. 1, 2, text-fig. 23a, b.—

Berry 1912a, p. 432.

Calliteuthis dofleini, Pfeffer 1912, p. 288.

Material examined: (i) One ♂ specimen with two hectocotylized arms, found by Mr. S. Takahashi in the stomach of a sperm-whale captured off the coast of Ibaraki Prefecture (lat. $36^{\circ}14'N$, long. $142^{\circ}18'E$), June 15, 1904 (Sci. Coll.). (ii) One ♂ specimen with one (left) hectocotylized arm, obtained at Yoshihama, Awa Prov., April 4, 1889 (Sci. Coll.). (iii) One ♀ specimen with perfect tentacles, obtained in Sagami Bay, date? (Sci. Coll.).

So far as I know, the above specimens are all that have ever been obtained of the species after the Doflein's specimen which served as type to Chun's description of the species. The latter was in so badly preserved condition that specific characters have not been fully known.

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Measurements of the specimens examined by me :

Sp. No.	i	ii	iii
Dorsal length of mantle	140 mm.	—	97 mm.
Ventral length of mantle	120 "	190 mm.	85 "
Breadth of mantle... ..	72 "	—	60 "
Dorsal length of head	—	75 "	55 "
Breadth of head	70? "	—	60? "
Length of fin... ..	42 "	—	38 "
Total breadth of fins	63 "	80 "	58 "
Breadth of eye-opening	Left 32 mm. Right 17 mm.	Left 37 mm. Right 20 mm.	Left 36 mm. Right 21 mm.
Length of first arm	376 " 370 "	380 " —	250 " 250 "
" " second arm... ..	— —	— —	305 " 307 "
" " third arm	— —	— —	285 " —
" " fourth arm	380 " 380 "	— —	250 " 270 "
Length of tentacle	— —	— —	250 " 270 "
" " club	— —	— —	55 " 55 "
Diameter of largest sucker of first arm	6.5	7	5
" " " " " second arm	6.5	7	5
" " " " " third arm	6.5	7	5
" " " " " fourth arm	3	3	2.5
" " " " " tentacle ...	—	—	5

Skin nearly choroidal, thickly beset with colorless warts. Mantle short, a little shorter than twice the breadth, tapering backward, acuminate behind, the dorsal anterior edge somewhat projecting in the middle and forming an obtuse angle, the ventral edge with a broad emargination laterally bounded by angular projections. Fins terminal, slightly projecting

backward beyond posterior end of mantle ; both together of a transversely oval shape, slightly notched at the anterior attachment as well as in the middle of their combined posterior edge.

Head large, as broad as mantle-opening. Siphonal groove shallow, marked by a faint boundary fold ; neck with distinct boundary edge in front, and with a minute papillary organ on each side. Eyes large, eye-opening nearly round, with an indistinct shallow notch at the anterior edge ; left eye-opening very large, being twice as wide as the right. Siphon short, extending for about one-fourth the length of head, its dorsal connective ligaments imbedded under the skin of siphonal groove.

Arms very long, thick ; subequal, the order of length being $2 > 3 > 4 > 1$ in the female specimen (no. iii) of 97 mm. mantle-length ; the longest pair about thrice as long as mantle. The umbrella in the same female specimen extends for a distance of 26 mm. from the angle between dorsal arms, 24 mm. between first and second pairs, 20 mm. between second and third pairs, 15 mm. between third and fourth pairs, and 10 mm. between ventral arms. Protective membrane of arms thick and choroidal, with zigzag edge-line, about half as broad as the suckers are high. Suckers nearly spherical, arranged in two series, the largest in the middle parts of arms and growing smaller towards both arm ends ; suckers of the fourth pair of arms much smaller than those of all other arms, being half as large in diameter as the latter. Horny rings with quadrangular teeth thickly arranged along their distal margin, the number of teeth in specimens Nos. i and ii varying from six to eleven, and in specimen No. iii from eight to nineteen. In the last specimen the horny rings often bear irregular horny masses, which sometimes entirely cover up the teeth.

Both the arms of dorsal pair are hectocotylized, their principal characteristics agreeing well with the account given by Chun (1906, 1910).

The tentacles of this species have hitherto been quite unknown. Their length is about equal to four times the mantle-length ; the stem in the distal parts is a little compressed, with a flat inner surface. Club lanceolate, of about one-seventh the length of the entire tentacle, provided with a web along the distal two-thirds of the length of its outer surface ;

proximally the web becomes broader, but finally terminates in a free, acute, retroverted point. A series of connective suckers, comprising about eleven suckers and fixing tubercles, begins to occur at about two-thirds the length of tentacle from base and reaches up to the proximal part of club.

Tentacular suckers, excluding the connective ones, may be divided into two groups, each consisting of about five series: (1) Suckers of the hand portion, which are highly variable in size, those of the median series being from six to twelve times as large as those of marginal series, while those of submedian series are about half as large as those of the median series. (2) Suckers of the distal portion, which are practically serial continuations of those of the hand portion and which are numerous, minute, and about equally sized, being smaller than marginal suckers of the hand portion.

Largest tentacular suckers short, pail-like in shape, with a very wide aperture; horny ring with about fifty or more fine, acute and inwardly directed teeth along the whole margin; interdental spaces nearly as wide as the teeth at base. Suckers of ventral submedian series and some proximal ones of the hand portion characteristically differ from all others in that they are of a somewhat quadrangular contour and the fundus of their hollow are raised to about the level of the aperture. Their horny ring is provided, along the entire edge, with about thirty, thick, triangular, outwardly directed teeth, the points of which inclose a space of a quadrangular shape, the four teeth at the corners of that space being thicker and longer than the rest.

The luminous organs of the mantle are not quite regular in distribution. Nevertheless, the edge of the mantle-opening always shows nine small luminous organs along the emarginated part, and more laterally four slightly larger ones on either side. For the rest, the ventral side of mantle is provided with about forty luminous organs, of which the posterior ten are smaller than those more anteriorly situated. On the dorsal side, there are found about as many luminous organs as on the ventral side, but all are smaller in size; especially small are the twenty-four situated in the median region.

Also on the head, the luminous organs are irregularly distributed. Its ventral surface exhibits about thirty-three large ones, of which eight are arranged in a series just in front of the siphonal groove. Besides the thirty-three, the margin of the right eye-opening shows a series of seventeen large organs, and that of the left eye-opening a series composed of five large ones in front and of four minute ones behind. The dorsal surface of head has five large and about eleven minute luminous organs.

The luminous organs of ventral arms are arranged, in the proximal half of their length, in three series; more distally, they occur in two series, and finally in the terminal parts they form a single series; the series of longest extent being the middle series made up of twenty-five organs. The luminous organs of first, second and third arm pairs consist of a single series of large organs on the ventral side, and of a single series of minute ones on the dorsal.

Buccal membrane broad, with seven ribs, projections and connective ligaments.

Radula with seven series of unicuspid teeth, which, as regards their length, show the following relations: median \doteq lateral \doteq $1/2$ inner marginal \doteq $1/3$ outer marginal.

Inner surface of mantle, siphon, buccal membrane, branchial vessels and adductor muscles of siphon show a purplish brown hue, while the anterior parts of neck as well as of siphonal groove are tinged with a darkish brown color.

Remarks.—Doflein's original specimen of this species was first taken by Chun to be identical with *S. ocellata* (Owen 1906), but was later made by Pfeffer into a new species under the name of *S. dofleini*. The specimens now before me, as also the Doflein's specimen, do not quite agree with Owen's original description of *S. ocellata*. In his *S. ocellata*, the horny ring of arm-suckers should have "a finely spinous border," which is not the case in *S. dofleini*. Further, the former seems to have luminous organs more numerous on head but less so on mantle than in the latter species, while the arms are much shorter, being only a little longer than mantle.

Genus **Meleagroteuthis** Pfeffer 1900.16. ***Meleagroteuthis separata*** Sasaki 1915.*Meleagroteuthis separata*, Sasaki 1915, p. 131, text-figs. 1, 2. Misaki.

This is a species closely allied to *Meleagroteuthis hoylei* Pfeffer, but differs from it (1) in the suckers of the distal parts of tentacular club being equal, small and grouped together without continuity to the series of suckers of the hand-portion, (2) in the luminous organs of the ventral pair of arms being arranged in nine series in the proximal parts, and (3) in the horny tubercles of the back of mantle being seventeen in number and small in size.

Fam. **Ommastrephidæ** (Steenstrup 1861).Subfam **Ommastrephinae** (Gill 1871).Genus **Ommastrephes** d'Orbigny 1835.17. ***Ommastrephes sloani pacificus*** (Steenstrup 1880).

Local name : Surume-ika (Tokyo, Sagami, Settsu,
Hokkaido), Ma-ika (Etchu, Kaga).

Todarodes pacificus, Steenstrup 1880, pp. 83, 90, etc. Hakodate. — Hoyle 1886, p. 163, pl. xxviii, figs. 1-5. Inland Sea. — Joubin 1897, p. 103. Vladivostok.

Ommastrephes pacificus, Appellöf 1886, p. 35, pl. iii, figs. 8-10. Nagasaki.

Ommatostrephes sagittatus var. *sloani*,? Wülker 1910, p. 21. Misaki; Todohokke, Hokkaido.

Ommastrephes sloani, Berry 1912a, p. 433, pl. vi, fig. 4. Tomakomai, Iburi Prov.; Hakodate; Tokyo; Misaki.

Ommatostrephes sloani pacificus, Pfeffer 1912, p. 456, pl. xxxiv, figs. 3-6. Japan.

Ommastrephes sloani pacificus, Ishikawa 1913, p. 586, 4 figs. Misaki; Niigata; Miye; Uodzu. Etchu Prov.; Iwami Prov.

This species is the commonest Oegopsid cuttle-fish found in Japan, and has a wide distribution extending from Kiushu to Hokkaido, on both the Sea of Japan and the Pacific Ocean sides. To it is referable the common dried cuttle-fish called "*Nibanzurume*" by the traders. The following is a list of specimens examined by the author.

No.	Specimens	Mantle-length	Locality	Date	Where preserved
i	1 ♀	244 mm.	Misaki	Dec. 13, 1908	Sci. Coll.
ii	1 juv.	50 mm.	Takashima, Hokkaido	June 10, 1907	Agr. Coll.
iii	1 juv.	47 mm.	Takashima	July 6, 1909	do.
v	3 ♂, 1 ♀	190-194 mm.	Oshoro, Hokkaido	July 15, 1910	do.
v	1 ♂, 2 ♀	155-175 mm.	Off Shakotan, Hokkaido	July 5, 1911	do.
vi	6 juv.	90-115 mm.	Kuwagasaki, Rikuchû Prov.	July 21, 1911	do.
vii	5 ♂, 5 ♀	210-255 mm.	Off Ohana- misaki, Hokkaido	Nov. 1, 1911	do.
viii	2 ♂, 1 ♀	163-170 mm.	Off Shakotan	July 5, 1912	Fish. Inst. Taka- shima, Hokkaido
ix	1 ♂, 1 juv.	158-170 mm.	Off Shakotan	July 13, 1912	do.
x	1 juv.	80 mm.	Atkeshi, Hokkaido	July? 1912	Agr. Coll.
xi	1 ♂, 1 ♀	242 mm. in ♂ 255 mm. in ♀	Obuyu-saki, Hokkaido	Aug. 19, 1912	do.
xii	2 ♂, 1 ♀	180-195 mm.	Off Shakotan	Aug. 30, 1912	Fish. Inst. Takashima
xiii	3 ♀	218-235 mm.	Hakodate market	Nov. 26, 1912	Agr. Coll.
xiv	2 ♀	253-280 mm.	Namerikawa, Etchû Prov.	April 25, 1913	do.
xv	3 juv.	31-36 mm.	Himi, Etchû	May 8, 1913	do.
xvi	1 juv.	80 mm.	Takashima	Sept. 3, year?	Fish. Inst. Takashima
xvii	1 ♀	250 mm.	Uetsu, Noto	—	Agr. Coll.

18. *Ommastrephes volatilis* Sasaki 1915.

Local name : Tobi-ika (Sagami Prov.).

Ommastrephes volatilis, Sasaki 1915, p. 138, pl. iv, figs. 1-6, text-fig. 3. Off Atami, Sagami Bay.

The principal characters distinguishing it from other species of the genus are as follows :

Foveola of siphonal groove without longitudinal folds within, but smooth. Ratio of breadth to length of mantle : 16-19 to 100. Fins taken together distinctly longer than broad, attenuated posteriorly. Horny ring of arm-suckers varying in denticulation in different suckers of each arm ; largest sucker of II arm provided with quadrangular supplemental teeth alternating with long sharp ordinary teeth. Horny ring of largest tentacular sucker with sharp teeth only and without any supplemental ones. Hectocotylus distinguished not only by degeneration of suckers and swelling of sucker-bases, but also by thickening and enlargement of the ventral protective membrane as well as by the sculpture of the outer surface consisting of pits and transverse grooves.

Subfam. *Stenoteuthinæ* Pfeffer 1912.Genus *Stenoteuthis* Verrill 1880.19. *Stenoteuthis bartrami* (Lesueur, 1821).*Loligo bartrami*, Lesueur 1821, p. 90; pl. ii, fig. 1a-f (fide Pfeffer).

Ommastrephes bartrami, d'Orbigny, in Fér. et d'Orb. 1839, p. 347; Calmars pl. ii; pl. xxi, fig. 5; *Ommastrephes* pl. ii, figs. 11, 12.—Gray 1849, p. 62.—Steenstrup 1880, p. 73 ff.; fig. 2, p. 76; fig. 3, p. 81.—Jatta 1896, p. 64, pl. x, figs. 1-16; text-figs. 8 (p. 10), 12 (p. 11), 36 (p. 19), 41 (p. 21). Neapel.

Stenoteuthis pteropus, Verrill 1880, p. 228, pl. xxvii, figs. 7, 7a; pl. xxvi, figs. 5-9. Bermuda.
—Verrill 1882, p. 317, pl. vii, fig. 2; pl. xvii, figs. 3-9.

Stenoteuthis bartrami, Verrill 1880, p. 223.—Verrill 1882, p. 322.—Pfeffer 1900, p. 180.
—Pfeffer 1908, pp. 97-100, figs. 109-115.—Pfeffer 1912, p. 465, pls. xxxv, xxxvi; pl. xxxix, figs. 1, 2. Atlantic Ocean (Holland, Cap. Isl., Brazil, West-Ind., North Sea,

Antilles, Campeche Bay, 13°N. 27°W, 20°N. 23°W), Mediterranean (Nizza, Egypt), Indian Ocean (Ceylon, Madagascar), Pacific Ocean (La Plata, China, Sagami Bay).

Material examined: One male and female specimens. Odawara, Sagami Prov., Nov. 1885 (Sci. Coll.). Mantle-length 240 mm. in ♂, 250 mm. in ♀.

Genus *Symplectoteuthis* Pfeffer 1900.

20. *Symplectoteuthis oualaniensis* (Lesson 1830).

Loligo oualaniensis, Lesson, in Lesson et Garnot 1826-'30, p. 240, pl. i, fig. 2. Oualan (fide Pfeffer).

Ommastrephes oualaniensis, d'Orbigny, in Fér. et d'Orb. 1835-'48, p. 351, Calmars pl. iii, pl. xxi, figs. 1, 2. Ommastrephes pl. i, figs. 14, 15. — Gray 1849, p. 63. — Hoyle 1886, p. 162. Coral Sea, North of the Admiralty Island.

Symplectoteuthis oualaniensis, Pfeffer 1900, p. 180. — Hoyle 1904, p. 32, text-fig. E. East of Cocos Isl. — Hoyle 1905, p. 982. South Nilandu Atoll. — Wülker 1910, p. 21. Misaki. — Pfeffer 1912, p. 502, pls. xl, xli, pl. xlii, figs. 1-4. Laysan, Ind. Oz., Okinawa, Japan, Oualan, Südsee. — Berry 1912a, p. 438.

Japanese specimens of this species have not come under observation of the author.

21. *Symplectoteuthis luminosa* Sasaki 1915.

Local name: Suji-ika (Sagami Prov.).

Symplectoteuthis luminosa, Sasaki 1915, p. 144, pl. iv, figs. 7-13, text-fig. 4. Off Misaki.

This is a species standing in very near relationship to *Symplectoteuthis oualaniensis* (Lesson), but differing from it in following respects:

Luminous organs present. Hectocotylized left ventral arm as thick as but a little shorter than, the right ventral; provided with about 24 normal suckers in the proximal parts; protective membranes as broad and thick as those of the right arm; distal 1/3 of the length not naked, but with 34 minute tubercles each set on a swollen base. Horny ring of largest tentacular suckers with only a single large tooth on distalmost edge.

Fam. *Thysanoteuthidæ* Keferstein 1866.Genus *Thysanoteuthis* Troschel 1857.22. *Thysanoteuthis rhombus* Troschel 1857.

- ? *Sepioteuthis major*, Gray 1828, p. 3, pl. iv, fig. 1. (fide Fér. et d'Orb.)—Fér. et d'Orb. 1835, p. 305, *Sepioteuthis* pl. vii, fig. 12.—Gray 1849, p. 83.
- Thysanoteuthis rhombus*, Troschel 1857, p. 70, pl. iv, fig. 12, pl. v, figs. 1-4. Messina (fide Pfeffer).—Tryon 1879, p. 167.—Weiss 1889, p. 91. Neapel.—Jatta 1896, p. 56, pl. ix, figs. 1-13, textfig. 54. Neapel, Ischia, Pozzuoli Bay.—Pfeffer 1900, p. 182.—Pfeffer 1912, p. 523, pl. xxvii, figs. 24-37. Mediterranean Sea, Atlantic Oc.—Berry 1912a, p. 438.

The present species had been included, by mistake of some authors, in the Japanese fauna. However, the actual existence of the species in the Japanese archipelago is proved by the following three specimens:

- i. One specimen, sex?, caught by Mr. K. Aoki, off Atami, Sagami Prov. Sept. 23, 1905 (Sci. Coll.).
- ii. One specimen, sex?, caught by a fix-net on the coast of Namerikawa, Etchu Prov., Nov. 1908 (Fish Inst. Namerikawa).
- iii. One ♀ specimen obtained at Uetsu, Noto (Agr. Coll.).

Principal measurements of the above specimens:

Sp. No.	i		ii		iii	
Dorsal length of mantle	180 mm.		685 mm.		290 mm.	
Breadth of mantle... ..	54 "		240 "		90 "	
Dorsal length of head	45 "		156 "		60 "	
Breadth of head	49 "		185 "		88 "	
Length of fin	175 "		674 "		290 "	
Breadth of fin altogether	157 "		637 "		300 "	
Length of first arm	Left 62 mm.	Right 58 mm.	Left — mm.	Right 150 mm.	Left 100 mm.	Right 100 mm.
" " second arm	75 "	77 "	—	160 "	120 "	120 "
" " third arm	123 "	127 "	—	240 "	196 "	186 "
" " fourth arm	70 "	71 "	—	170 "	106 "	108 "
Length of tentacle	160 "	157 "	—	500 "	235 "	230 "

Fam. **Chiroteuthidæ** Gray 1849.Subfam. **Chiroteuthinæ** Chun 1908.Genus **Chiroteuthis** d'Orbigny 1839.Subgenus **Chirothauma** Chun 1910.23. ***Chiroteuthis (Chirothauma) imperator*** Chun 1910.

Local name : Yûrei-ika, Mizu-ika (Sagami).

Chiroteuthis macrosoma, Nishikawa 1906, p. 109, pl. iii. Off Shimo-osa Prov.*Chiroteuthis (Chirothauma) imperator*, Chun 1910, pp. 240, 241, 281, pl. xxxviii; pl. xxxix, figs.

1-10; pl. xl, figs. 2-5, 7; pl. xli; pl. xlii, figs. 1-4; pl. xliii; pl. xliv, figs. 3, 6-16. Nias-

Süd-Kanal, Sumatra; Sagami-Bai, Japan.

List of specimens examined :

Specimens	Mantle-length	Locality	Date	Where preserved
2, sex ?	110-140 mm.	Misaki	Sept. 1887	Sci. Coll.
3, much injured	—	Odawara, Sagami	May 1, 1891	do.
2 ♀	149-180 mm.	Misaki	Aug. 27, 1891	do.
1 ♀	245 mm.	Off Misaki, 350 fathoms	May 1, 1899	do.
1, ♀?	225 mm.	Misaki	Sept. 24, 1908	do.
1 ♀	100 mm.	Sembombana, Numazu	Sept. 1912	Agr. Coll.

In some badly preserved specimens, the neck region is narrowed as was stated by Goodrich for *Chiroteuthis macrosoma* from off the Kistna delta.

Subfam. **Idioteuthinæ** nov.Genus **Idioteuthis** nov.24. ***Idioteuthis latipinna*** sp. nov. Pl. III.

Diagnosis.—Body large, with thick choroidal integument; surface smooth in all parts. Mantle elongate-conical, being broadest anteriorly;

Mantle-opening wide and free along the entire margin, of which the dorsal median margin protrudes a little forwards, forming a short but broad triangular projection; lateral margins concave; ventral margin projecting beneath head, its median region slightly curving backwards. Fins very thick and large, the length being about equal to $5/6$ of mantle-length, and taking both of them together, are nearly circular in shape, though acuminate posteriorly and slightly emarginated at the anterior attachment.

Head very large, being a little broader than mantle-opening; siphonal groove rather shallow, smooth within, and without sharp boundary edge at the anterior end. Eyes unequal in size and shape; right eye of usual shape, the eye-opening provided with a shallow sinus in front; left eye of a peculiar shape, with large eyeball and wide eye-opening twice as broad as that of the right side. Neck smooth, but with a minute semicircular membranous papilla on each side.

Siphon nearly conical, short, reaching to about the middle of head; dorsal siphonal connective ligaments in 2 pairs, entirely embedded in integument. Siphonal resisting cartilage oval in shape, becoming a little wider backwards, with a deep median groove which also becomes wider and deeper posteriorly; mantle cartilage about as long as the siphonal and of a crest-like shape, as high as long, and becoming higher backwards. Nuchal cartilage of a bisquit-like outline, narrowed in the middle, and provided with a longitudinal median ridge with a groove running along the crest. Buccal membrane thick and fleshy with finely wrinkled inner surface, with eight connective ligaments and with seven somewhat indistinct ribs and marginal projections. Outer lip thin; inner lip thick, with papillate margin.

Arms long and unequal, the formula of their length being $4 > 2 > 3 > 1$; longest arm a little shorter than mantle-length. First and second arms a little flattened laterally, with a keel along their outer surface. Second and fourth arms quadrangular in section, with a web along their ventral outer edge. Protective membranes of all arms as broad as length of suckers. Suckers nearly semicircular, with thin and narrow horny edge, which is

sometimes thickened into an irregular shape ; papillary area very narrow and thin, surrounded by glandular radial muscles. Suckers in all arms thickly arranged in two series of about sixty-five each.

Tentacles slender, with cylindrical stalk, the distal half forming a thick club, which tapers gradually towards tip and is a little flattened in the proximal parts but distally changes into cylindrical ; protective membrane broad, supported by numerous distinct muscular ribs. Suckers depressed, oval, very obliquely attached ; aperture very wide, oval, with distal margin distinctly notched. Suckers in the proximal parts of club in oblique rows of four each ; distally the number of suckers in each row gradually increases up to about twenty-four. At the same time the suckers grow smaller ; while the proximal suckers are about as large as the largest sucker of arms, those at tip of club are very minute and scarcely visible to the naked eye. Horny ring with about ten, blunt, short, outwardly directed teeth along the distal edge ; often showing some horny noxes of varying sizes in some part of the margin. The noxes well developed in proximal suckers, generally covering up the entire edge as well as all the teeth ; especially so in largest suckers in which the noxes fuse together into an irregularly tubercled thick mass along the entire margin of horny ring (Pl. III, figs. 2-5).

In the mantle cavity, there exists a pair of elongate elliptical glandular organs in the middle of the inner surface of ventral mantle. This organ seems to constitute an important characteristic of this species ; it has, so far as I am aware, never been before noticed in any other known cuttlefish.

Color purplish brown all over.

Radula and gladius not examined.

The type specimen, preserved in alcohol, was captured by Mr. K. Aoki in Sagami Sea, outside the Okinosé bank from a depth of about 400 fathoms.

The principal measurements are as follows :

Dorsal length of mantle	238 mm.
Ventral length of mantle	235 „
Breadth of mantle...	65 „

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III

Length of head	80 mm.
Breadth of head	78 "
Length of fin...	200 "
Total breadth of fins	210 "
Length of first arm	...	...	...	...	...	Left	...	Right	140 mm. — mm.
" " second arm	...	...	...	...	...	175	"	175	"
" " third arm	...	...	...	...	...	150	"	150	"
" " fourth arm	...	...	...	...	...	195	"	195	"
Length of tentacle...	...	...	...	...	...	390	"	349	"
" " club	...	...	...	...	...	240	"	230	"

Remarks.—The present species differs from all hitherto known Oegopsids in many respects. The choroidal nature of the body, the absence of hooks, the characters of neck and of its appendage, and the shape of fins seem to indicate that it stands in nearest relationship to the Chiroteuthidæ, though it lacks luminous organs. However, the final determination of the relationship may well be deferred until a more precise knowledge is gained of the anatomical character of the species.

Fam. Cranchiidæ Gray 1848.

Genus *Cranchia* Leach 1817.25. *Cranchia scabra* Leach 1817.

Cranchia scabra, Leach 1817, p. 137. West Afrika (fide Pfeffer).—Fér. et d'Orb. 1839, p. 222; Cranchies, pl. 1, fig. 1; Rossia, pl. 1, figs. 1-5. Antillen.—Gray 1849, p. 38.—Pfeffer, 1900, p. 195.—Hoyle, 1904, p. 43, pl. x, fig. ii. North Pacific Ocean 960 miles from Guadalupe Island.—Chun, 1910, p. 328, pl. xlviii, figs. 1, 2; pls. xlix, 1; pl. lx, figs. 1-6. Lat. 0°20'N., long. 6°45'W.; lat. 4°56'N., long. 78°15'O.—Pfeffer, 1912, p. 679. pl. xlviii, figs. 22-26. 10°S., 172°W; Pac. Oz.; Ind. Oz.; Südsee (?); Südatlantischer Oz.

A single specimen from Misaki stood at my disposal for examination.
Mantle length 13 mm.

Genus *Liocranchia* Pfeffer 1884.26. *Liocranchia reinhardti* (Steenstrup 1856).

Leachia reinhardti, Steenstrup 1856, p. 200. Azoren [fide Pfeffer].

Loligopsis reinhardti, Tryon 1879, p. 165.

Cranchia reinhardti, Brock 1882, p. 605, pl. xxxvii, fig. 4.

Perothis reinhardti, Rochebrune 1884, p. 25.

Liocranchia brockii, Pfeffer 1884, p. 25, figs. 33, 33a. Northern west coast of New Guinea.

Liocranchia cf. *reinhardti*, Pfeffer 1884, p. 29, fig. 35. China Sea.

Cranchia (*Liocranchia*) *reinhardti*, Hoyle 1886, p. 184, pl. xxxi, figs. 11-14; pl. xxxii, figs. 1-4. Tropical Atlantic. Oc.

Liocranchia reinhardti, Pfeffer 1900, p. 194. — Chun 1906, p. 84. — Issel 1908, p. 218, pl. ix, figs. 24-26; pl. x, fig. 27. Caraibische Meer. — Chun 1910, p. 336, pl. li, figs. 5-7. Guinea-Strom, Ausläufer des Benguelastromes, indischer Nordäquatorial stromes. — Pfeffer 1912, p. 667, pl. xlvi, figs. 1-3. Java-See, Küste von Neu Süd-Wales, Chili, China, New Guinea, Süd-See.

A single specimen obtained at Abratsubo, near Misaki, on Dec. 26, 1894 (Sci. Coll.), was studied by me. Mantle-length 19 mm.

27. *Liocranchia* sp. Berry, 1912.

Liocranchia sp., Berry 1912a, p. 438. Japan (very immature specimen impossible of determination).

Genus *Pyrgopsis* Rochebrune 1884.28. *Pyrgopsis pacificus* (Issel 1908).

Zygænopsis pacifica, Issel 1908, p. 223, pl. x, figs. 33-44. Between Tahiti and Pango-Pango.

Euzygæna pacifica, Chun 1910, p. 354, pl. lii, figs. 1-3. Sagami Bay, Atlantic Oc.

Pyrgopsis pacificus, Pfeffer 1912, p. 661.

Material examined: (i) Three ♀ specimens, Misaki, date? (Sci. Coll.). Mantle-length 40-50 mm. (ii) One ♂ specimen, Entrance to Moroiso, Misaki, March 29, 1905 (Sci. Coll.). Mantle-length 42 mm.

Genus **Loligopsis** Lamarck 1812.29. ***Loligopsis chrysophthalmos*** (Tilesius).

Sepia chrysophthalmos, Tilesius, pl. xxxviii, f. 32, 33. Japan (fide Fér. et d'Orb.).

Loligopsis chrysophthalmos, d'Orb., in Fér. et d'Orb. 1835-48, p. 324, Calmaret pl. i, figs. 2-4.

A species impossible of exact systematic determination. The genus itself is an uncertain one.

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Explanation of Plate III.

Idioteuthis latipinna gen. nov., sp. nov.

1. The type specimen in $\times 1/3$.
 2. Largest sucker of third arm in $\times 1/4$.
 3. Largest sucker of tentacle in $\times 1/6.5$.
 4. A sucker from middle of the length of tentacular club in $\times 1/8$.
 5. A sucker from the distal parts of tentacular club in $\times 1/20$.
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